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**REMARKS**

Claims 1-19 are all the claims presently pending in the application.

Applicant gratefully acknowledges that **claims 2-8** would be allowable if rewritten in independent form. However, for the reasons set forth below, Applicant respectfully submits that all of the pending claims (i.e., claims 1-19) are in condition for allowance. Therefore, Applicant reserves the right to rewrite allowable claims 2-8 in independent form, at a later time.

Claims 9-19 have been added to provide more varied protection for the features of the present invention.

It is noted that new claims 9-19 are added only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claim 1 stands rejected on prior art grounds under 35 U.S.C. 102(b) as being anticipated by Wilkerson, Jr., et al. (U.S. Patent No. 6,539,038; hereinafter "Wilkerson").

This rejection is respectfully traversed in the following discussion.

**I. THE CLAIMED INVENTION**

The claimed invention provides a signal converter in which amplitude control and bias control can be simplified (e.g., see specification at page 5, lines 1-4).

For example, in an illustrative, non-limiting aspect of the invention, as defined, for example, by independent claim 1, a signal converter for converting a digital input signal to an optical modulation signal includes a Mach-Zehnder type optical modulator to be

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supplied with the digital input signals controlled in amplitude, and a bias signal for providing the optical modulation signal, a pilot signal-superimposing circuit for superimposing a pilot signal of a frequency on a bias control signal, a monitor circuit for providing a monitor signal by receiving a part of the optical modulation signal supplied from the optical modulator, a first feedback system for providing an amplitude control signal to control an amplitude of the digital input signal in accordance with a frequency deviation signal obtained from the monitor signal, and a second feedback system for providing the bias control signal to control the bias signal in accordance with a multiplying frequency deviation signal obtained from the monitor signal.

## II. THE PRIOR ART REJECTION

Claim 1 stands rejected on prior art grounds under 35 U.S.C. 102(b) as being anticipated by Wilkerson.

The Examiner alleges that Wilkerson discloses all of the features of the claimed invention. Applicant respectfully submits, however, that Wilkerson does not disclose or suggest all of the features of independent claim 1. Therefore, Applicant respectfully traverses this rejection.

Wilkerson discloses a reference frequency quadrature phase-based control of drive level and DC bias of laser modulator.

In Wilkerson, a single frequency signal output from a frequency or tone generator (oscillator) 40 is split via a cosine coupling circuit 42 and a sine coupling circuit 44 into quadrature-phase (Q) and in-phase (I) frequency components, that are relatively orthogonal (e.g., see column 3, lines 35-45). The quadrature-phase (Q) frequency

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component is supplied to an amplitude controller of an analog driver 20 and the in-phase (I) frequency component is supplied to a bias controller 30 (e.g., see Figure 2).

Due to an extinction ratio deviation and a bias deviation, the Q and I frequency components of the tone generator (oscillator) 40 are fed to an output signal of a photo detector 330 (e.g., Figure 2). The Q and I frequency components are demodulated by Q and I synchronous demodulators 150 and 250, respectively, to provide tone signal differences (errors) at the DC level. The tone signal differences (errors) are input to the amplitude controller of the analog driver 20 and the bias controller 30 to control the circuit such that no frequency component of the tone generator (oscillator) 40 exists in the input signal of the photo detector 330, thereby optimizing the extinction ratio and the bias point.

As described above, Wilkerson discloses that quadrature phase based (Q and I) frequency components (phases of the frequencies are relatively orthogonal) generated from a single reference signal are respectively applied to the analog driver and bias controller.

According to the structure of Wilkerson, the cosine coupling circuit 42 and sine coupling circuit 44 are indispensable for providing the quadrature phase-based (Q and I) frequency components. Thus, the circuit structure including such cosine and sine coupling circuits becomes undesirably complicated.

In other words, Wilkerson relates to a quadrature-phase based control which requires the cosine and sine coupling circuits, thereby undesirably complicating the signal converter.

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In comparison, in the exemplary aspects of the present invention, a first oscillator 4 for generating a pilot signal having a frequency  $f$  and a second oscillator 20 for generating an internal reference signal having a twofold frequency  $2f$  are provided.

In the exemplary aspects of the claimed invention, output signals having frequency  $f$  and  $2f$  of the first and second oscillators 4, 20 are respectively input into a bias controller (e.g., only a bias controller).

On the other hand, a primary frequency component detected by a monitor photo diode 8 is demodulated by a first demodulator (e.g., a mixer 17 and a low pass filter 18), so that an  $f$  deviation signal is obtained. Further, a secondary frequency component detected by the monitor photo diode 8 is demodulated by a second demodulator (e.g., a mixer 21 and a low pass filter 22), so that a  $2f$  deviation signal is obtained.

In the exemplary aspects of the claimed invention, the  $f$  and  $2f$  deviation signals are input to an amplitude controller of a driver 3 and a bias controller to control the circuit such that no frequency component exists in the input signal of the monitor photo detector 8, thereby optimizing the extinction ratio and the bias point (e.g., see Figure 2; see also related descriptions of Figure 2 in the specification).

As set forth above, the exemplary aspects of the claimed invention provide a pilot signal of frequency  $f$  and an internal reference signal of frequency  $2f$  which are respectively applied to the bias controller.

Applicant respectfully submits, however, that according to the novel and unobvious structure of the exemplary aspects of the claimed invention, the cosine and sine coupling circuits 42 and 44 (e.g., as disclosed, for example, by Wilkerson) are not required. Thus, signal converter according to the exemplary aspects of the claimed

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invention can be provided with a simpler structure in comparison with the prior art (e.g., in comparison with Wilkerson).

For the foregoing reasons, Applicant respectfully submits that Wilkerson clearly does not disclose or suggest all of the features of independent claim 1, and thus, does not anticipate claim 1 of the present application. Therefore, the Examiner respectfully is requested to withdraw this rejection and permit claim 1 to pass to immediate allowance.

### III. NEW CLAIMS

New claims 9-19 are added to provide more varied protection for the present invention.

Applicant respectfully submits that new claims 9-19 are patentable over the cited reference for somewhat similar reasons as those set forth above with respect to claim 1, as well as for the additional features recited therein.

Therefore, the Examiner respectfully is requested to permit claims 9-19 to pass to immediate allowance.

### IV. FORMAL MATTERS AND CONCLUSION

Minor errors have been corrected in the disclosure.

In view of the foregoing, Applicants submit that claims 1-19, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone

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number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Applicant notes that this Amendment is timely submitted without an extension of time fee since the due date of June 4, 2005 fell on a weekend.

Respectfully Submitted,

Date: June 6, 2005

  
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**CERTIFICATE OF TRANSMISSION**

I certify that I transmitted via facsimile to (703) 872-9306 the enclosed Amendment under 37 C.F.R. § 1.111 to Examiner Joseph P. Martinez on June 6, 2005.

  
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